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Pathological Investigation of Diseases of Broilers in Some Farms of Mymensingh

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Abstract: A pathological investigation was carried out at three different broiler farms around the Bangladesh Agricultural University, Mymensingh from day-old chicks up to marketing. The diseases were diagnosed both grossly and microscopically as aspergillosis, salmonellosis, choline deficiency, yolk sac infection, mycoplasma-colibacillosis complex, hydropericardium hepatitis syndrome, infectious bursal disease and pneumonia, with the case fatality rate of 77.97, 73.91, 66.67, 56.25, 50.00, 36.36, 33.33 and 18.57%, respectively. In farm no. 1, yolk sac infection, mycoplasmosis-colibacillosis complex and infectious bursal disease were diagnosed pathologically, with the morbidity and mortality rate of 2.00, 1.50, 2.25, 1.25, 1.00 and 0.50%, respectively. In farm no. 2, yolk sac infection, salmonellosis, aspergillosis, infectious bursal disease, mycoplasmosis-colibacillosis complex, hydropericardium hepatitis syndrom, pneumonia and choline deficiency were confirmed both grossly and microscopically, their morbidity and mortality rate were 1.11, 5.10, 12.00, 0.44, 0.88, 2.67, 0.67, 0.67, 0.44, 3.75, 10.00, 0.44, 0.22, 0.88, 0.22 and 0.44%, respectively. In farm no. 3, pneumonia, yolk sac infection, mycoplasmosis-colibacillosis complex, aspergillosis and hydropericardium hepatitis syndrome were diagnosed by gross and microscopic examination, their morbidity and mortality rate were 0.87, 0.65, 1.96, 1.08, 4.56, 0.22, 0.22, 1.09, 0.22 and 1.74%, respectively. The findings indicate that aspergillosis is the major disease problem in broiler farming in Mymensingh.

Key words: Investigation, diseases, broilers, farms of mymensingh

Introduction

Broiler raising is an important part of poultry industry in Bangladesh and poultry meat is becoming popular day by day. Broiler farming is the most suitable and cheapest way to fulfill the target of demand of meat, which will not only generate employment opportunity but also encourage the unemployed youths to take up this type of farming as a means of self employment. Scientific breeding, feeding, management and disease control are the key points of success in poultry improvement program. One of the major constraints in the development of poultry industry in Bangladesh is the outbreak of diseases, which cause about 30% mortality of chickens in every year (Ali, 1994). A through knowledge about the epidemiology, pathogenesis and pathology of a particular disease is a prerequisite for proper diagnosis of the malady, as well as, for the prevention and control of the disease. Among the various diagnostic procedures necropsy remains in the key position. Considering the above mentioned facts, a pathological investigation on the diseases of broilers was undertaken to study the incidence, morbidity and mortality of the diseases of broilers and to describe the gross and microscopic lesions in various organs in different diseases.

Materials and Methods

The pathological investigation was carried out at three different broiler farms around the Bangladesh Agricultural University (BAU), Mymensingh from day-old chicks up to marketing of the broilers. The farms were visited everyday and the morbidity, mortality, age of affection of various disease/conditions were recorded. The affected or birds were collected and taken to the Department of Pathology, BAU, Mymensingh, for necropsy and diagnosis of diseases/conditions. The diagnosis of different disease/conditions was based on the history, clinical signs and characteristic gross, as well as microscopic tissue alterations.

Clinical Signs: The clinical signs exhibited by the individual bird during illness were recorded in detail in a prescribed according to the description of the respective poultry farm`s owner. In addition, sometimes some sick birds were kept under careful observation with feed and water ad libitum till death to record the detailed clinical signs along with other abnormalities and all of them are necropsied soon after death.

Gross Pathology: The postmortem examination in all the cases was performed as soon as the dead birds were collected and carried to the Department. At necropsy, gross tissue changes were observed and recorded carefully and representative tissue samples containing lesions were fixed in 10 per cent buffered neutral formalin for histopathologic studies.

Histopathology: The histologic tissue sections were stained with hematoxylin and eosin for histopathological studies following the procedures described by Luna (1968). In addition, some tissue sections were subjected to special staining techniques, whenever necessitated.

Isolation and Identification of Bacteria: The suspected sample was collected aseptically from yolk sac

contents of the yolk sac infected dead broiler. Special attention was given to the *Escherichia coli*. Individual single colony from EMB agar plate was isolated and identified.

Results

The present pathologic investigation identified a number of maladies responsible for morbidity and mortality of broilers. Diseases of broilers diagnosed in 3 farms along with morbidity, mortality patterns and age of the affected birds are shown in Table 1. Overall prevalence of diseases of broilers with their age susceptibility and case fatality rate is shown in Table 2.

Infectious Bursal Disease: A total of 6 broilers were found to be affected by infectious bursal disease (IBD) in farm 1 and farm 2 of which 4 died. Morbidity varied from 0.44 to 1.00% and mortality varied from 0.44 to 0.50%. All affected birds were at the age group between 20 to 23days.

Gross Lesions: The affected birds exhibited increased mucus in the intestine. The bursa of Fabricius was swollen, haemorrhagic, necrosed and sometimes contained yellowish caseous mass. Occasionally, haemorrhages were observed at the junction between proventiculus and gizzard. Lungs were also congested and heamorrhagic.

Table 1: Diseases of broiler diagnosed in farms along with morbidity, mortality patterns and age of affection

Farm	Total No. of birds	Disease diagnosed	No. affected	Age of infection (days)	No. of death	Morbidity (%)	Mortality (%)
		Infectious bursal disease	4	20-23	2	1.0	0.50
		Yolk sac infection	8	2-4	6	2.0	1.50
1	400	Mycoplasma-colibacillosis complex	9	7-11	5	2.25	1.25
		Yolk sac infection	5	2-3	2	1.11	0.44
		Salmonellosis	23	5-10	17	5.10	3.75
		Aspergillosis	54	12-22	45	12.00	10.00
		Infectious bursal disease	2	21	2	0.44	0.44
		Mycoplasma-colibacillosis	4	24	1	0.88	0.22
2	450	complex					
		Hydropericardium hepatitis syndrome	12	32-34	4	2.67	0.88
		Pneumonia	3	21	1	0.66	0.22
		Choline deficiency	3	9-10	2	0.67	0.44
		Pneumonia	4	3	1	0.87	0.22
		Yolk sac infection	3	5	1	0.65	0.22
		Mycoplasma-colibacillosis	9	5-17	5	1.96	1.09
3	460	complex					
		Aspergillosis	5	16	1	1.08	0.22
		Hydropericardium hepatitis syndrome	21	29-31	8	4.56	1.74

Table 2: Overall prevalence of diseases of broilers with their age susceptibility and case fatality rate

Diseases	Age (weeks)			Total no. of cases encountered affected	Total no. of death	Case fatality (%)
	0-1	>1-3	>3-5			
Aspergillosis	0	59	0	59	46	77.97
Infectious bursal disease	0	0	6	6	4	33.33
Hydropericardium hepatitis syndrome	0	0	33	33	12	36.36
Yolk sac infection	16	0	0	16	9	56.25
Mycoplasma-colibacillosis complex	0	18	4	22	11	50.00
Salmonellosis	0	23	0	23	17	73.91
Pneumonia	4	0	3	7	2	18.57
Choline deficiency	0	3	0	3	2	66.67

Microscpic Lesions: Microscopically, the section of bursa showed degeneration and necrosis of lymphocytes in the medullary area of follicles, which was sometimes replaced by heterophils and pyknotic debris (Fig.1). There were haemorrhage and congestion in the follicles. Sometimes only ghosts of follicles remained. Throughout the lung tissue fibrinous exudation, necrotic debris and edema were exhibited. Kidney revealed haemorrhage and congestion with mild infiltration of inflammatory cells. Heart showed mild edema in the endocardium.

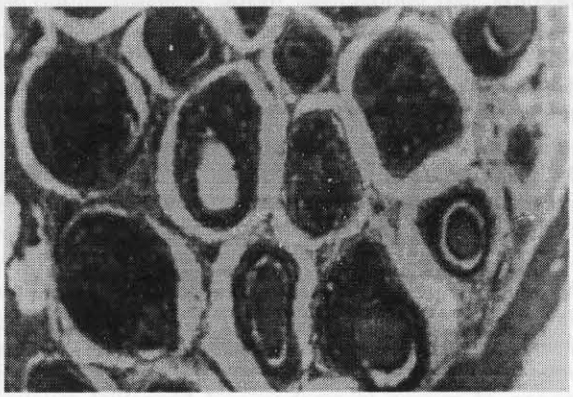

Fig. 1: IBD infected bursa shows caseous necrosis of lymphocytes in the medullary area of follicles with infiltration of inflammatory cells (H & E, x 82.5)

Hydropericardium-Hepatitis Syndrome (HHS): A total of 33 cases of HHS were recorded of which 12 died at the farm 2 and farm 3, at the age between 29-34 days. Morbidity varied from 2.67-4.56% and mortality varied from 0.88-1.74%.

Gross Lesions: At necropsy, the carcasses were found in good flesh with generalized congestion, edema and ascites. Sometimes bloody exudation was exhibited in the abdominal cavity. The pericardium was thickened and pericardial sac contained excess clear transparent fluid which gave the heart appearance of Leechi. Besides, heart muscles were congested and severe petechial haemorrhages were found on the base of the heart. Liver was enlarged and congested with nodular focal necrosis in many cases. Kidneys were enlarged and congested. Intestines were found haemorrhagic. Spleen became congested, dark and atrophied. Lungs revealed generalized congestion and edema.

Microscopic Lesions: The most stricking histologic lesions were found in the heard. The lesions consisted of myocardial edema, generalized congestion, extravasations of erythrocyte, severe infiltration of mononuclear cells in the myocardium and myocardial necrosis that severely broke the continuity of cardiac muscle. Multifocal coagulative necrosis with mononuclear cell infiltration and basophilic intranuclear inclusion bodies in hepatocytes were present in few cases of liver section (Fig. 2). Nephrotic lesions including degeneration, dissociation and extensive coagulative necrosis of tubular epithelial cells with very minimum mononuclear cell infiltration were occasionally seen in the kidneys. The intestine of the majority of the birds showed severe haemorrhagic enteritis that was characterized by infiltration of mononuclear cells and haemorrhages in lamina propria, necrosis of villous epithelium and seromucous exudates attached with villous surface. Lungs in most of the cases exhibited

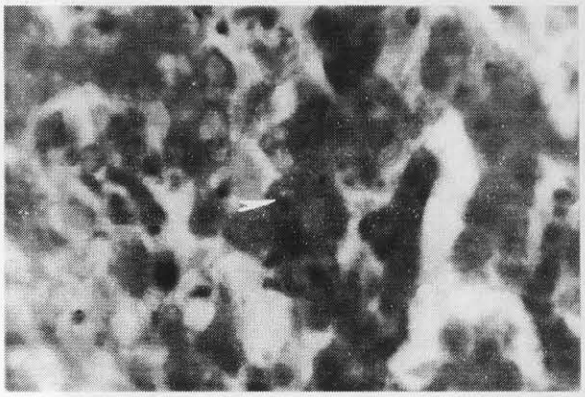

Fig. 2: Basophilic intranuclear inclusion body in hepatocytes of the HHS affected bird (H & E, x 82.5) (arrow)

severe congestion and edema.

Yolk Sac Infection: During first week of age 9 out of 16 (56.25%) chicks were died due to omphalitis or yolk sac infection in all three farms.

Gross Lesions: Necropsy examination revealed considerably thickened unabsorbed and edematous yolk in all the dead chicks. The content of the sac were cloudy and malodorous. There were congested blood vessels around the yolk. The livers in few chicks were markedly pale.

Microscopic Lesions: The wall of the infected yolk sac was edematous. There was an outer connective tissue zone followed by a layer of inflammatory cells and deposition of fibrin (Fig. 3). The section of pale liver showed congestion and dissociation of hepatocytes.

Salmonellosis: This investigation recorded a total of 23 cases of salmonellosis of which morbidity was 5.10% and mortality 3.75%. The birds were between 5-10 days of age.

Gross Lesions: The liver was enlarged and congested and in few cases liver revealed puntiform haemorrhages and focal necrosis. Petechial hemorrhages were seen in spleen, base of the heart and kidneys. Lungs were pneumonic in some cases. There was catarrhal

inflammation in the intestine.

Microscopic Lesion: In liver, there was congestion, haemorrhages and scattered areas of necrosis with mononuclear cell infiltration and sinusoidal congestion (Fig. 4). The intestinal mucosa exhibited congestion, haemorrhages and infiltration of inflammatory cells and in many instances sloughing of mucosal epithelium as well as marked thickening. The pulmonary lesions consisted of diffuse congestion and haemorrhage associated with sero-fibrinous exudation.

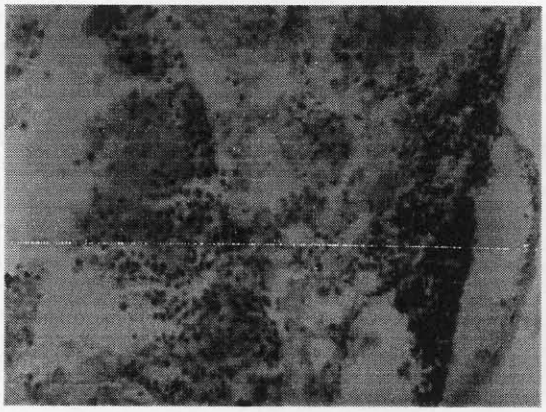

Fig. 3: The wall of the yolk sac of yolk sac infected chicks which is edematous with infiltration of inflammatory cells and deposition of fibrin (H & E, x 330)

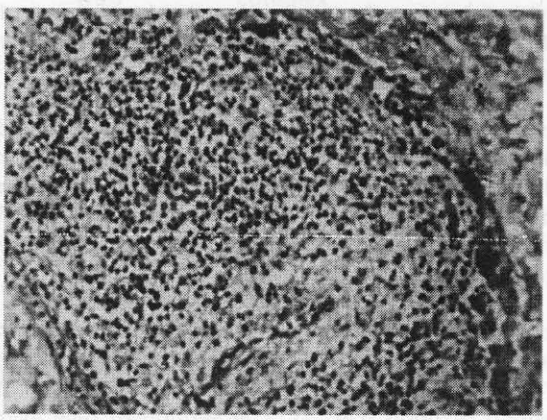

Fig. 4: Salmonellosis infected liver shows focal degeneration and infiltration of round cells (H & E, x 330)

Mycoplasma-colibacillosis Complex: Among the infected 22 chicks, 5-24 days old, 11 were died due to this malady with morbidity rate 0.88-2.25% and mortality rate 0.22-1.25%.

Gross Lesions: Presence of catarrhal exudates in nasal passage and trachea. Petechial haemorrhge on spleen and base of the heart were observed. Thickening of the air sacs, fibrinous perihepatitis and pericarditis with extensive deposition of fibrin on the surface of visceral organs were also noted.

Microscopic Lesions: The histologic section of the lungs showed interstitial pneumonia characterized by proliferation of fibrous connective tissue and infiltration of mononuclear cells in the interstitium, alveoli and lumen of the bronchus and parabronchus. Fibrin deposition in and around the alveoli, lumen of bronchioles and parabronchi. In the pleura, there was thickening of connective tissue capsule due to mononuclear cells and proliferation of connective tissue. Heart revealed haemorrhage, congestion, infiltration of mononuclear cells and extensive fibrin deposition. Liver showed haemorrhage and congestion.

Aspergillosis: Aspergillosis was diagnosed in 59 chicks of 12 to 22 days of age. The morbidity varied from 1.08-12.00% and mortality varied from 0.22-10.00%.

Gross Lesions: Most of the birds found severely emaciated and cachectic. Yellowish and /or whitish nodules of different sizes and shapes were found mainly in the lungs, airsacs, pleura and peritoneum. Presence of mucus in trachea and bronchial mucus plugs were seen.

Microscopic Lesions: Presence of multiple nodular lesions in the lung parenchyma were observed. These granulomatous lesions consisted of central area of caseation necrosis surrounded by macrophages, foreign body type giant cells, lymphocytes and fibrinous connective tissue. Pleuritis were characterized by extensive infiltration of mononuclear cells associated with connective tissue proliferation. Septate hyphae of *Aspergillus sp.* were observed on PAS stain.

Pneumonia: A total of 7 cases of non-specific pneumonia were found of which 2 chicks died at the age between 3-21 days.

Gross Lesions: Lungs were extensively haemorrhagic and congested.

Microscopic Lesions: There was extensive haemorrhage and congestion in the lungs with infiltration of heterophils and mononuclear inflammatory cells. There was exudative filling of the bronchi and parabronchi. Interstitial pneumonia, bronchopneumonia and pleuritis were also observed.

Deficiency Disorder: A total of 2 birds were died due to choline deficiency at the age of 9-10 days old. The affected birds showed no specific symptoms except poor growth. At necropsy, the liver revealed fragile and accumulation of yellowish fat in the abdomen. This condition was considered as choline deficiency. After death of two birds, the disorder was controlled by

supplementation of choline in the feed.

Discussion

The highest broiler proportionate mortality in the present investigation was recorded 77.97% due to Aspergillosis. This was followed by Salmonellosis 73.91%, Choline deficiency 66.67%, Yolk sac infection 56.25%, Mycoplasma-colibacillosis complex 50.00%, Hydropericardium hepatitis syndrome 36.36%, Infectious bursal disease 33.33% and Pneumonia 18.57%.

In the present study it was found that 46 birds (44.66%) out of total 103 dead birds died due to aspergillosis. However, Kutubuddin (1973), Sarker (1976), Kamal (1989), Bhattacharjee *et al.* (1996), Islam *et al.* (1998) and Talha (1999) observed 9.33%, 6.66%, 10.61%, 5.11%, 4.3% and 4.20% cases of aspergillosis, respectively. This findings indicate that the aspergillosis still present in the poultry farms as a havoc but varies from farm to farm depending upon the management systems. The pathologic lesions observed in the present investigation were similar to those described by Lange (1914), Nieberle (1923), Iskandar *et al.* (1992), Samad and Chakraborty (1993) and Talha, (1999).

Salmonellosis was recorded in 23 cases, in the present study of which 17 birds died. (Kutubuddin, 1973; Sarker, 1976; Kamal, 1989; Bhattachatjee *et al.*, 1996 and Islam *et al.*,1998) recorded salmonellosis in 12.0, 10.0, 4.82, 9.28 and 9.2% cases, respectively from the poultry of Bangladesh. The gross and microscopic lesions observed in the present study are almost similar to those recorded by Chishti *et al.* (1985), Kamal (1989) and Mutalib and Hanson, (1989).

Hydropericardium-hepatitis syndrome (HHS, Angara Disease, Leechi disease) was recorded in 33 cases of which 12 birds died. However, the occurrence of this disease has never been reported in Bangladesh earlier. The gross and microscopic lesions and clinical signs observed in the present study were almost similar to those described earlier by Anjum *et al.* (1989), Cheema *et al.* (1989) and Shane and Jaffery (1997) for this disease. Similar outbreak has also been reported from Chittagong Government Veterinary College (Biswas *et a/.*, 2000 and Rahman *et a/.*, 2000).

In the present study, mycoplasma-colibacillosis complex were recorded in 22 cases of which 11 died. Islam *et al.* (1998) recorded this disease with relative occurrence of 20.9%. However, Talha (1999) recorded the occurrences of mycoplasmosis and colibacillosis in 8.66 and 5.51%, respectively. Sarker (1976) and Bhattachatjee *et al.* (1996) recorded colibacillosis in 5.0 and 10.61% birds, respectively. This malady produce fibrinous inflammation on the serous surfaces of the various organs which is similar to those described by Talha, (1999).

Yolk sac infection was found in all the three farms, a total of 16 birds were affected of which 9 birds died. The birds were at the age between 2 and 5 days. Kutubuddin (1973) and Sarker (1976) did not observe yolk sac infection in the birds of Bangladesh Agricultural University Poultry Farm. On the other hand, Kamal (1989) recorded omphalitis in 39 (12.54%) cases in the Bangladesh Agricultural University Poultry Farm. The gross and histopathologic lesions are similar as reported by other researchers (Hofstad *et al.*, 1994 and Kamal, 1989).

(Kutubuddin, 1973; Sarker, 1976 and Kamal, 1989) conducted pathologic investigations on the mortality of chickens in Bangladesh Agricultural University Poultry Farm and did not detect the prevalence of infectious bursal disease, but Islam *et al.*, (1998) and Talha (1999) recorded 16.0% and 19.16% mortality of chickens respectively in Mymensingh. The present study detected IBD only in 6 cases with mortality 0.44% - 0.50%. The gross and microscopic lesions noted in IBD are similar to those described by (Helmboldt and Garner, 1964;Lukert and Hitchner (1984); Sam and Baruah (1998) and Talha (1999).

Choline deficiency and non-specific pneumonia are recorded in the present study. Bhattacharjee *et al.*, (1996) reported 8.22% cases related to malnutrition and Islam *et al.* (1998) recorded 6.10%. Talha (1999) recorded non-specific pneumonia in 22 (5.77%) cases.

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